Strategy Research Project

RAPID ACQUISITION IMPACT ON MAJOR DEFENSE ACQUISITION PROGRAMS

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RAPID ACQUISITION IMPACT ON MAJOR DEFENSE ACQUISITION PROGRAMS

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ABSTRACT

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Joint Urgent Operational Needs Statements (JUONS) and other demands from warfighters can significantly impact the cost, schedule, and performance of well-established Major Defense Acquisition Programs (MDAP). JUONS and other unplanned requirement changes require streamlining of Defense Acquisition System (DAS) processes to meet immediate operational requirements. Rapid Acquisition is one such streamlining process. To acquire a capability rapidly may require programs to divert critical program of record assets and resources. Such diversion can also directly or indirectly affect many other integrated programs. MDAPs that follow a traditional sequential development acquisition process, versus an evolutionary acquisition cycle, struggle to meet both the objective program of record requirements and the rapid acquisition demands. This paper examines the impact of rapid acquisition demands on MDAPs and provides recommendations to improve the DAS and MDAP processes to satisfy unplanned but essential warfighter requirements.

RAPID ACQUISITION IMPACT ON MAJOR DEFENSE ACQUISITION PROGRAMS

Major Defense Acquisition Programs (MDAPs)[1] represent a significant investment of resources and time for the Department of Defense and the Military Services.[2] The Department of Defense depends on the success of MDAPs to meet the material needs of the warfighters. MDAPs embody warfighting capabilities that protect our troops, advanced weapons systems that intimidate and deter our adversaries, and systems-of-systems to overwhelm and dominate the enemy and bolster our allies. In today's operational environment, most MDAP systems are highly integrated components of carefully crafted operational design and architecture. The integrated MDAP system supports, and is supported by, many other operational systems, including intelligence, command & control, and kinetic weapons. To manage the development and procurement of MDAPS and other programs, the Department of Defense has developed the Defense Acquisition System (DAS) as part of the Integrated Defense Acquisition, Technology, Logistics and Life Cycle Management System.[3] The major players in the DAS—the Department of Defense, Congress, and Industry—must manage MDAPs with acute foresight, flexibility and balance.

Experience shows that MDAPs take a great deal of time to develop, test and field to meet operational requirements safely. As MDAP systems are developed and fielded, they must enhance combat operations. Stepping through the full development and testing phases of a program to ensure the system is designed and operates properly takes time. Such long lead times, however, are luxuries that an Army at war can ill afford. Warfighters may go to war with the best equipment and training available, but a modern Army quickly discovers that the fight demands more of the same equipment or

newer, faster, and smarter equipment. Extended conflict magnifies these needs, and rapid program evolution can save lives. Such vital warfighting requirements comprise the Joint Urgent Operational Needs Statements (JUONS) from the Combatant Commands to the Joint Staff or from the warfighters through the Service Headquarters Staff.

These immediate warfighting requirements inevitably disturb well-developed MDAP Programs of Record (PoR) and disrupt carefully crafted acquisition strategies and processes. Such disruptions to the MDAPS can in turn launch ripple effects on other programs and processes throughout the Defense Department and Service Departments. To meet such critical warfighting needs, the defense acquisition community has developed in an ad hoc fashion several streamlined acquisition processes, including the Rapid Acquisition process. This paper will explore the impact of the relatively new phenomenon of Rapid Acquisition on established MDAPs and will recommend ways to meet warfighters' immediate needs without abandoning the achievements of careful acquisition plans and processes. Sophisticated technology gives the American warfighters tools that are lethal for our enemies and lifesaving for our allies. However, such tools are only as effective as the bureaucracy that acquires them. This paper proposes ways that our acquisition bureaucracy can demonstrate the flexibility and sophistication needed to win modern conflicts and saves warfighters' lives.

Preparing the Force

Planning and resourcing for armed conflict is an arduous and multifaceted task. As Yaneer Bar-Yam of the New England Complex Systems Institute wrote in 2003, "War is a complex encounter between complex systems in a complex environment."[4] Organizing, equipping, and training a military takes strong leadership, vision, time and a

steady source of funding. This is especially true across Military Services and joint agencies within the Department of Defense. As the 2009 Army Modernization White Paper highlighted, "the Army must continuously modernize to counter the threats we face today, and are likely to face tomorrow. The costs of modernizing are measured in dollars, but the cost of failing to modernize on time, will be measured in future risk to the Nation and its Soldiers."[5] To ensure that soldiers get the best equipment and capabilities from the DAS, the warfighter community must clearly and efficiently articulate and substantiate their operational requirements.

The Department of Defense identifies and validates the operational requirements through the Joint Capabilities Integration & Development Systems (JCIDS).[6] Like the DAS, the JCIDS is a complex and laborious process when followed completely. The JCIDS process is necessarily complicated, however, because of the need to clearly define the warfighter requirements in an objective, measurable form so that acquisition professionals can develop and procure the best possible materiel solutions. Requirements for advanced capabilities often challenge existing technology. In many cases, new technology must be developed and refined to meet the requirements. To meet warfighters' immediate needs, technological advances may initially meet only minimal levels of acceptability. Over time, viable technology matures and disperses through acquisition systems integration.

The United States must simultaneously allocate resources to sustain the current force and prepare for new conflicts. Our military operations run the gamut from humanitarian assistance, peacekeeping, security & stability operations to full-scale war. The extraordinary variety of missions and operational environments may in some cases

require an equally ambitious revolution in military affairs, as described in H.R.

McMaster's December 2009 *World Affair Journal* article.[7] However, in most cases, the

change in military capability is a slow, gradual transformation—an evolutionary process

that facilitates adaptability as needs in the operational environment arise. Assessing

and predicting the threats that the United States will face in the coming years is a vexing

challenge that is only haphazardly met by the acquisition bureaucracy.

The United States and her allies must enable their forces to act quickly when

called. Congress, the Department of Defense, Military Services, and other

organizations and commands that make up the military arm of national power work hard

to ensure the military forces are continuously modernized and organized to meet

projected and unanticipated threats. This process takes years and billions of dollars,

and it requires a very careful balance of requirements, technologies, and resources.

The process the Department of Defense uses to transform requirements and resources

(especially funding) into materiel solutions and capabilities is called the Defense

Acquisition System (DAS).

Defense Acquisition System

Developed out the necessity to bring order and control to the massively complex

task of generating the warfighting tools necessary to supply our troops, the Department

of Defense, with Congressional oversight, has created the Defense Acquisition System.

The DAS is "the management process by which the Department of Defense provides

effective, affordable, and timely systems to the users."[8] The Department of Defense

Directive (DoDD) 5000.01 further elaborates that the DAS "exists to manage the

nation's investments in technologies, programs, and product support necessary to

achieve the National Security Strategy and support the United States Armed Forces.

The investment strategy of the Department of Defense shall be postured to support not only today's force, but also the next force, and future forces beyond that."[9] Process directives and regulations such as the DoDD 5000.01 and Department of Defense Instructions (DoDI) 5000.02 help guide the acquisition team to develop and field "the most effective weapon systems in the world."[10] Over time, however, this process has become sclerotic and vastly complicated in an attempt to manage multiple risks and husband the limited resources available.

Since the mid-twentieth century, Congress and the Department of Defense have endeavored to restructure and reform the DAS to reduce the time and resources required to develop and deliver needed capabilities and keep in check what President Dwight D. Eisenhower cautioned were the "unwarranted influences…of the military-Industrial complex."[11] The most recent acquisition reform act, the Weapon Systems Acquisition Reform Act (WSARA) of 2009, was signed by President Obama on May 22, 2009.[12]

The Defense Acquisition System is a Gordian knot of rules, regulations, and other forms of checks & balances to control the massive expenditure of resources in support of our national defense. Many of today's weapon systems are extremely complex and highly integrated and constantly push the limits of technology. The introduction of new technologies and capabilities into the field takes time as well. The process of delivering operational capabilities to the warfighters, from concept development to initial operational capability, involves multiple discreet steps that must be carefully synchronized over the life of the system.

The DAS offers several entry points into the acquisition process; the appropriate entry point depends on several factors, such as the maturity of the technology and the willingness of the warfighter to assume the risk of system failure and life cycle costs. New weapon systems are often developed through the traditional steps in the life-cycle framework of the acquisition process pre-systems acquisition, systems development and acquisition milestones and sustainment phases.[13] The steps in this life-cycle framework acquisition process require a myriad of developmental and operational tests, approvals and validations, and reams of documentation often taking years to complete, depending on the complexity and intricacy of the system under development.

Based on the DoDI 5000.02, the Milestone Decision Authority (MDA) will determine the entry point in the DAS for a new technology or system after conducting the Materiel Development Decision (MDD) review.[14] The MDD supporting documents outline the operational concept, establish the need for the capability, and explain why a non-materiel solution (such as a new Tactic, Technique, and Procedure (TTP)) cannot satisfy the requirement.[15] Following the MDD review, the program may proceed to the Materiel Solution Phase (pre-Milestone A) or to another appropriate Milestone Decision point. An established technology or capability may enter the DAS at Milestone B, Engineering and Manufacturing Development phase. If the technology and system is sufficiently mature and funding is available to support the procurement, operational fielding and sustainment, the program may move straight into full-rate production post-Milestone C. Some systems can be procured as Commercial-Off-The-Shelf (COTS), but still need to be properly evaluated in terms of the operational utility in the field

environment. COTS system are not always designed and manufactured with the soldier and operational environment in mind.

Ordinarily, unproven technologies enter the DAS at Milestone A - the Technology Development Phase. At this point, the program faces extended design development and testing. During this Technology Development Phase, several prototypes may compete for the final stages of development and production.

The years spent in development of these new systems are also spent aligning the procurement and operational funding, force structures, training facilities, production capacity, sustainment processes, and many other elements that work to build, deliver, and sustain the weapon system in the field. Skipping or accelerating steps in the process creates risks for the Program of Record—risks that are not always acceptable in hindsight if and when a system fails to deliver as expected. The extensive DAS process—with multiple entry points into the acquisition process, program reviews, milestone decisions and documentation—is cumbersome but risk adverse. Weapon systems rushed to the field before thorough development and testing run a higher risk of failure. Soldiers need rapid deployment of new technologies to achieve their mission and protect their lives, but they may also pay the ultimate price for shortcuts and waivers in the procurement processes.

As a major component of the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System, the Defense Acquisition System must match capability needs with materiel solutions.[16] The Defense Acquisition System uses a relatively complex combination of discreet steps to translate warfighter requirements into materiel solutions. Some materiel solutions act as stand-alone systems to meet a

specific requirement, but other materiel solutions are highly integrated and inter-

dependent system-of-systems designed and developed to meet a complex set of

requirements. Here the DAS must work in close concert with the JCIDS and the

Planning, Programming, Budgeting, & Execution System (PPBES) processes.

Despite the cumbersome nature of large integrated bureaucracies, the United

States Defense Acquisition Community and Defense Industry produces the most

technologically advanced weapon systems in the world. In summary, the 2006 Defense

Acquisition Performance Assessment Project report stated:

> The existing Acquisition System is the product of more than 60 years of
> continuous focus dedicated to fielding systems with the best possible
> performance. Despite its flaws, this system has produced some of the
> finest military equipment that the world has known. It has delivered the
> foundation for today's military and it has become an important element of
> U.S. strategic advantage.[17]

The DAS is complicated for reasons established over many years of experience

and refined by numerous reforms. By design there are numerous senior level reviews,

decision points, and sequential entry and exit criteria. DAS complexity reflects

technological complexity and extraordinary public expenditures. Such complexity

demands transparency and careful oversight.

Acquisition strategies for MDAPs vary widely. From development to fielding, the

systems team—combat developers, materiel developers, oversight managers, resource

managers, and test & evaluation managers—must weigh the costs, time, and

requirements when deciding how quickly a system can be developed, acquired and

given to the soldiers. The low risk approach may require a strategy that follows a lock

step development and testing process to build a system that achieves 100 percent of

the requirements to the First Unit Equipped (FUE). This approach incurs higher upfront

costs in research, development, and test & evaluation, but much lower costs for life cycle sustainment with fewer upgrades and retrofits required. This approach provides design and budgetary stability, but cannot always meet the needs of warfighters in multiple Theaters and asymmetric, dynamic conflicts. Low bureaucratic risks may well actually create high tactical risks for soldiers.

Confronted with the exigencies of modern war, the Department of Defense thus prefers an evolutionary acquisition strategy.[18] The evolutionary acquisition process balances three critical acquisition elements—cost, schedule, and performance. An acquisition adage holds that one can only maximize two of the three elements at any single time.[19] Evolutionary acquisition may require multiple funding sources, capability trade-offs, requirements adjustments, capability upgrade delays, testing requirement waivers and careful risk management.

Following the evolutionary process requires anticipation of product upgrades in order to meet all threshold performance requirements. The evolutionary acquisition process involves multiple incremental improvements. An evolutionary program can field a militarily suitable capability to the soldiers while maturing the sub-systems through sequential upgrades. Unfortunately, such a program may incur higher costs for time and materials required to take the systems out of service for upgrades or retrofits. An additional challenge posed by the evolutionary acquisition process is management of multiple configurations. Multiple configurations can also confuse and confound users, especially if there are numerous, rapid upgrades to consider.

Despite complex procedures and legal mandates, however, multiple developmental steps may enable a program with an urgent operational demand to

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provide the warfighter with rapid support. Streamlined, non-traditional acquisition

processes can also supply limited quantity, limited use capabilities. Streamlined

acquisition strategies can move a needed capability to the field quickly, even if the

capability only partially fulfills operational requirements.

Such streamlined procedures have disadvantages, however, that must be

reckoned with over time. These disadvantages include risks created when testing is

reduced or requirements waived. These risks must be mitigated and managed as the

program matures. Unfortunately, some risks become exponentially more difficult to

manage as the program progresses. For example, if a program accelerates a system

through the DAS to meet an immediate operational need in a desert environment, the

program might skip environmental design criteria and testing to cover severe cold

weather operations. If the risk is not addressed in the initial program, when that system

confronts a severe cold weather environment, the process of upgrading and testing may

be expensive and time consuming.

Developing the right acquisition strategy for a program is key to an effective DAS

process. The acquisition strategy plan is thus one of the most important documents

written early in the acquisition process. Funding profiles, contracting methods, and

other programmatic details depend on the completeness of the acquisition strategy.

While some capabilities require relatively simple plans, the many programs that

represent the more complicated acquisition strategies and large expenditures are

designated as Major Defense Acquisition Programs.

Major Defense Acquisition Programs

Major Defense Acquisition Programs are designated as ACAT-1C or ACAT-1D

by having total eventual expenditure in excess of $365 million or being designated as a

special interest program by the Secretary of Defense.[20] While a program may enter the

DAS as an ACAT-II or –III, the program may be re-designated as an ACAT-I program

well into the acquisition cycle if it meets one or both of these criteria. An example of

such a redesignation was the Army's Extended Range Multi Purpose (ER/MP) Medium

Altitude Endurance (MAE) Unmanned Aircraft System (UAS) program. More than two

years elapsed after the redesignation of the acquisition category status for the ER/MP

before the program's budget baseline and acquisition strategy accurately reflected the

status change.[21] Requirements such as decision reviews, documentation, and oversight

vary significantly between acquisition category programs. The DAS process entails

numerous requirements for MDAPs.

The MDA for ACAT-1D MDAPs is the Under Secretary of Defense for

Acquisition, Technology, & Logistics (USD(AT&L)).[22] ACAT-1C programs are often

relegated to the Department of Defense Component Acquisition Executive (CAE) for

milestone decisions.[23] In both cases the laws, regulations, and guidelines remain the

same. When a program requires Office of the Secretary of Defense (OSD) oversight,

however, the program usually requires additional time to meet approval gates and

decision points. When the technology is needed urgently, however, the MDA can justify

the risks inherent in fielding a new, unproven capability. The rapid development and

fielding of the new Mine Resistant Ambush Protected (MRAP) vehicles is an example of

such an expedited track.

With rare exceptions, MDAP systems provide a materiel solution to carefully

crafted and thoroughly vetted requirements established in the JCIDS process. To meet

the user's expectations, the new system must demonstrate the ability to meet or exceed

a set operational Key Performance Parameters and Key Systems Attributes. MDAPs

must also meet numerous developmental technical test requirements prior to receiving

an authority to operate certificate and being released for use by soldiers. When a

system is accelerated through the acquisition process, some requirements may be

waived or mitigated. Such requirement waivers can create capability gaps in the fielded

system, as measured against the Initial Capability Document, the Capability

Development Document, or the Capability Production Document. Combat developers

establish these capabilities standards which are then validated by the Joint

Requirements Oversight Council for the warfighters.

Capability Gaps

Military leaders cannot perfectly assess future threats and operational

environments when planning the development and fielding of new weapon systems.

When the need arises, commanders and planners select the best available force

structure and equipment to accomplish the mission. Sometimes technological needs

become clear only during the fight or after the smoke has cleared. Assessment by the

warfighters, as well as analysis by the Army's Center for Lessons Learned and Army

Capabilities Integration Center, can often reveal shortcomings in systems being used by

soldiers in theater—operational and logistic deficiencies that must be overcome as

quickly as possible.

In a 2009 issue of *Foreign Affairs*, Secretary of Defense Gates stated, "The

Department of Defense's conventional modernization programs seek a 99 percent

solution over a period of years. Stability and counterinsurgency missions require 75

percent solutions over a period of months. The challenge is whether these two different

paradigms can be made to coexist in the U.S. military's mindset and bureaucracy."[24] In

this article and in other speeches, Secretary Gates has advocated the quick introduction of safe, reliable capabilities in an evolutionary acquisition process. Meet the capability gaps that exist in theater now, he contends, and provide upgrades or replacement capabilities over time if warranted. Unfortunately, many MDAP programs in development were neither designed nor funded to accelerate during the research and development phase.

Most MDAP systems span many years and have a pre-planned product Improvement (P^{3}I) program to accommodate upgrade requirements and parts obsolescence issues. The P^{3}I programs represent an evolutionary acquisition strategy. However, the P^{3}I are not always easy to accelerate, because of either technology maturation or projected funding profiles.

Where operational shortfalls exist, the warfighters compensate for the lack of suitable materiel solutions through modifications of tactics, techniques or procedures or through ad hoc materiel solutions. The quick reaction fixes demonstrated by the soldiers in the hedgerows of Normandy following the D-Day landing exemplify such soldier ingenuity and innovation. Welding serrated teeth to the front of tanks to cut through the thick hedgerow bushes helped Allied forces quickly overcome a major capability shortfall during the early stages of the invasion.[25] Eventually, materiel developers adopted an intermediate solution and began to provide a more permanent integrated solution to this problem through the development and delivery of fully engineered and tested capabilities. Similar operational problems confronted unarmored light-skinned utility vehicles during the early stages of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Once again, soldiers adapted in the field by

creating their own ad hoc armor plating. Unfortunately, the DAS vehicle programs were

so ingrained in the deliberate acquisition process that even after six years and a special

emphasis designation of the Secretary of Defense, the Acquisition Community still

struggles to meet the high demand up-armored vehicles and MRAP systems to protect

our troops.

<u>Urgent Operational Need Statements</u>

Today's forces in theater face shortfalls ranging from simple logistical

redistribution needs to demands for entirely new functional capabilities.[26] The

warfighters can now call command attention to such shortfalls through several Urgent

Operational Need Statement processes, including the Joint Urgent Operational Needs

Statement (JUONS) to the Joint Staff and the OSD-level Joint Rapid Acquisition Cell

(JRAC).

As operations in theater continue, new missions and new operational needs

constantly arise. Warfighters have a process developed by the JRAC and Joint Staff

and by their own Service Component to highlight unmet operational needs. Through

their Military Department Staff and to the Joint Staff, the warfighting commands and

Combatant Commanders signal operational and capability shortfalls with Urgent

Operational Need Statements (UONS).[27] The Combatant Commands submit JUONS to

the Joint Staff, while the subordinate commands within the Army, Navy, Air Force, and

Marines each have their own UONS process.[28] Regardless of the way a capability gap

comes to light, once the appropriate staff validates the warfighter's need, materiel

developers must respond rapidly with minimal disruption to the existing operational

architecture and programs of record. Whenever possible, UONS should be aligned with

the established and funded modernization plans. However, if warfighters require a

novel technology or capability, the Military Department responsible for the new system must determine how to integrate it into the existing architecture, or field a compatible replacement.

In July 2009, the Defense Science Board noted that "[a]ll of DOD needs cannot be met by the same acquisition processes."[29] Over time, and following a series of reform acts over the past several decades, the DAS has added flexibility into the acquisition process to accommodate variation in program designs. Within its statutory and regulatory boundaries, the acquisition process provides some flexibility to Program Managers and Milestone Decision Authorities to streamline the acquisition process and tailor acquisition strategy to meet the demands of the warfighters. How to streamline a program for accelerated rapid acquisition depends on many factors, to include the technology readiness level, available funding, and force structure.

Assessing and validating a technology's maturity usually proves the most difficult task in rapidly fielding a new capability. The Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Directorate of Defense Research & Engineering (DDR&E), in close coordination with the Directorate of Developmental Test and Evaluation (DDT&E), has the responsibility to assess the technological maturity of major programs at key decision points in the program.[30] Developmental and operational testing may be required to properly assess technological readiness. Additional parametric assessments can be applied if the system is already in use in another capacity. Conducting the right test or assessment requires specific technical expertise. Coordinating the required test facilities, subject matter experts, and test articles can be a daunting challenge.

Funding for rapid acquisition projects may come from voluntary sources, such as available or excess funding within a program line. Funding may also require involuntary measures - OSD or Service level comptrollers may cut other budget items to pay for unfunded rapid acquisition programs. OSD may redistribute allocated funds, or Congress may provide supplemental funding

Contractor operational and logistical support may temporarily solve force structure problems. However, reliance on contractor support must be tempered as the program matures and force structure issues are resolved. Over time, the high cost and operational limits of contractor support at the unit level of operation—especially in a combat zone—can frustrate commanders.

The Acquisition Program Manager and Service Staffs must also consider industrial capacity, safety, and long-term supportability issues when deciding to accelerate a program through the rapid acquisition process.

Extended Range Multi Purpose (ER/MP) Unmanned Aircraft System Program

In a 2008 speech to Air War College, Secretary of Defense Robert Gates emphasized the need to provide more Intelligence, Surveillance, and Reconnaissance (ISR) capabilities and Unmanned Aircraft System (UAS) in Theater as quickly as possible.[31] Secretary Gates also stated that "unmanned systems cost much less and offer greater loiter time than their manned counterparts, making them ideal for many of today's tasks."[32] At the request of the Combatant Commander and with the support of the newly formed ISR Task Force, the Secretary called for accelerated use of UAS aircraft and critical ISR payloads. While the Army's Extended Range Multi Purpose MAE UAS program seemed a prime candidate for acceleration, that acceleration would come at a price.

Following the September 2001 terrorist attacks, the Air Force MQ-1B Predator Drone Medium Altitude Long Endurance (MALE) Unmanned Aircraft System (UAS), developed as an Advanced Concept Technology Demonstration (ACTD), proved quite useful to missions in Afghanistan. The Predator Drones provided sustained aerial ISR capabilities without risks of a manned aircraft. From the initial ACTD configuration, the MQ-1B UAS has transformed over the years through a series of upgrades, retrofits, and P3I initiatives. Today the system provides extremely critical warfighting capability with Electro Optical Infrared (EO/IR) cameras providing Full Motion Video (FMV) to Signals Intelligence (SIGINT) collection and with other critical operational payloads. From an altitude of approximately 25,000 feet, the MQ-1B allows the commander and warfighters a unique view of the battlefield with near real-time ability to detect, track, and destroy planned targets or targets of opportunity.[33] The Air Force has had such great success with the MALE UAS programs that they have continued to procure and field additional systems to meet the Theater's increased demand for additional ISR Combat Air Patrols (CAPs).

While the Air Force was developing the MQ-1B Predator UAS, the Army fielded several tactical UAS (TUAS) systems to include the MQ-5B Hunter and the RQ-7B Shadow. While both Army systems provided key tactical level ISR support to the field, the Army needed a much more robust system with extended range and long endurance capability. Army commanders sought a UAS in the MALE category of UAS, modeled on the MQ-1B Predator but with greater payload capacity, longer endurance and higher reliability.

After initial deliberation and a full and open competitive source selection process, the Army in 2005 selected General Atomics Aeronautical Systems Incorporated (GA-ASI), manufacturers of the MQ-1B, to build the military's newest MALE UAS based on the ER/MP Joint Requirements Oversight Council (JROC) approved Operational Requirements Document (ORD).[34] Leveraging the advances made in the Air Force's MQ-1B Predator program, the Army designed an advanced MALE UAS meant to advance its warfighting capability and eventually replace the RQ-5 Hunter UAS systems throughout the active force.[35] In 2004 and 2005, the Army also fielded a Government Owned, Contractor Operated (GOCO) MALE UAS capability in support of Task Force Odin.[36]

The ER/MP program began as a deliberate development and fielding initiative; however, the program's initial acquisition strategy was disrupted. The original initial operational capability (IOC) was planned for 2007, but slipped to 2009 and again to 2011 in part because changes in joint requirements modified the key performance parameters and key system attributes mandates. Additionally, the Vice Chief of Staff of the Army directed that the program divert resources to develop an early fielding package of two Quick Reaction Capability (QRC) platoons of ER/MP aircraft and ground support equipment.[37] The QRC systems used eight of the first 12 prototype aircraft off the assembly line to field two platoons of four aircraft each. With the MQ-1B Predator configuration as a baseline, the Army planned to quickly develop and test a more robust configuration with new payloads and functional capabilities, but soon faced technical and programmatic challenges to meet all KPPs outlined in the ORD. The new aircraft was eventually designated the MQ-1C ER/MP UAS.

Like many other large and complex programs, the ER/MP program depends on other programs to deliver sub-systems and payloads. The ER/MP program must receive and integrate sub-systems and payloads from separate Program of Record Program Managers, often from disparate Program Executive Offices. For example, the Program Manager for Robotic Unmanned Sensors (PM RUS) provides the Common Sensor Payload (CSP) Electro-Optical Infrared (EO/IR) sensor package. The Program Manager for Aerial Common Sensors (PM ACS) provides the Tactical Signal Intelligence (SIGINT) Payload (TSP) and Synthetic Aperture Radar / Ground Motion Tracking Indicator (SAR/GMTI) payload.[38] Additionally, the ER/MP program must synchronize development, integration, and testing activities of many other programs.[39]

Changes to the ER/MP program can significantly impact the supporting programs. For example, the CSP acquisition strategy and development program had to be adjusted at least three times to accommodate the ER/MP program changes resulting from the QRC rapid acquisition program. Additionally, the request to accelerate the second and third unit equipped caused PM RUS to make significant changes to the procurement and expected delivery dates for the payloads to meet the integration timeline for the ER/MP.[40] As a direct result of the decision to accelerate SIGINT capabilities in Theater, PM ACS and PM UAS had to modify their programs accordingly to address the new payload integration schedule for the ER/MP program. A new payload and sub-system likewise significantly affects the software development process, which requires long lead interface control documents and test assets to cycle into the development process.

Changes to the main platform resulting from the decisions to rapidly integrate a new capability or accelerate the development and procurement of the whole system can disrupt more programs than anticipated. As the ER/MP program morphed into an ACAT-1D program, the Program Staff had to carefully weigh the effects on other programs and assess the viability of the rapid acquisition plan based on the main Program of Record schedule.

As the ER/MP program was developing, the prime contractor continued to adjust its personnel, production capability, and processes to accommodate the program's needs. These adjustments required a very dynamic balancing act. The introduction of the QRC configuration rapid acquisition requirement disrupted the timeline for the production of the MQ-1 aircraft—including the Air Force MQ-1B and the Army's MQ-1C Block 1 aircraft. The disruption delayed the MQ-1C and created a gap in the production plan. Production gaps can disrupt manning requirements, test schedules, and the flow of parts and sub-systems that the prime contractor has to absorb. The six month gap in the MQ-1 line could have cost GA-ASI hundreds of thousands of dollars to maintain an idle production line in preparation for main order to proceed. Fortunately, the Air Force received additional funds to procure additional MQ-1B aircraft in 2009, thus filling the gap and keeping keep the production line active.

As OIF and OEF continued, the forces required additional unmanned aircraft to meet the growing demand for ISR coverage. The Army quickly contracted GA-ASI to establish a GOCO capability with the I-GNAT UAS.[41] Over time the Army provided additional GOCO systems with MQ-1 variants, including the Warrior Alpha and the MQ-

1C Block 0. The QRC MQ-1C Block 1 aircraft became the first Army GOCO MALE UAS system deployed into Theater.[42]

All these systems had disparate configurations with few ties to the main development program for the MQ-1C Block 1 FUE configuration, yet these systems demanded significant management and resources to support and operate. War contingency supplemental funding covered most of these systems' costs, but the personnel to develop, produce, and support the UAS came from the same prime contractor. Through a concerted effort with the program team, including the prime contractor, PM UAS began to carefully manage the multiple MQ-1 configurations as a family of systems and consolidated the capability upgrades and maintenance plans as much as possible to achieve efficiencies.[43] The rapid acquisition programs created multiple configurations to sustain and thus strained the PM's limited resources and personnel.

During the early stages of the Systems Development and Demonstration Phase (now known as the Engineering and Manufacturing Development Phase), the ER/MP program followed a traditional build-test-fix process.[44] The introduction of the QRC and program acceleration caused PM UAS to look for ways to shorten the schedule. One risk taken by the PM was to reduce and delay the developmental testing (DT) and tailor the operational test (OT) to include Customer Testing (CT) and Limited User Testing (LUT).[45] To accelerate the program to meet Initial Operational Capability (IOC) for the FUE, PM UAS requested approval to enter OT while still conducting DT requirements.[46] The MDA and independent evaluators agreed to accept this risk to ensure the system was fielded on time. The Initial Operational Test & Evolution (IOT&E) was also

postponed by almost two years to allow the PM to establish the final configuration and procure additional aircraft to replace the ones diverted to the QRC program.[47]

The ER/MP program was originally intended to replace the existing MQ-5B Hunter.[48] As the MQ-5B Hunter UAS approached retirement, upgrades and replacements were neither planned nor funded.[49] The war (i.e., Operation Iraqi Freedom and Operation Enduring Freedom) and ER/MP program delays, particularly the QRC diversion, demanded the Army retain tactical UAS capability. The Army, therefore, had to invest significant supplemental funds to upgrade and sustain the aging TUAS fleet, especially given the high operational tempo required in theater.[50] PM UAS took advantage of the upgrade programs and developed a plan to achieve commonality and interoperability within all Army systems. This plan included compliance with an OSD directive to migrate to a common data link (CDL) waveform, as well as efforts to standardize the architecture and interface control in the ground control stations (GCS) and warfighters' remote video terminals (RVT).[51]

Linking the Army UAS programs together may prove beneficial to the Army in the long term with regards to sharing initial development costs and systems interoperability. Such linkage, however, may also prove difficult if the PM is forced to lock in a non-compliant configuration for a rapid acquisition initiative. When programs are so closely linked, a change to one program may impact the requirements for the other programs. Modifying one program can be difficult, but modifying multiple systems simultaneously is often very expensive and extremely challenging.

Diverting critical resources—such as initial developmental and test assets and critical engineering, programmatic, and test personnel—to create, field and support a

limited quantity of aircraft in a unique configuration posed a daunted challenge for the relatively new ER/MP program. However, by re-baselining the program schedule, adding critical supplemental Global War on Terrorism / Other Contingency Operations funding and leveraging senior leadership support, the UAS PM was able to successfully adjust the program.[52] The PM also took advantage of the program delay to advance the ER/MP's operational and sustainment capabilities with more advanced payloads, ground systems, and data links. The schedule delay and additional funding likewise provided the opportunity to fully integrate the ER/MP with other UAS in the Army's inventory as a coordinated system-of-systems.[53]

When the original equipment manufacturer (OEM), GA-ASI Aircraft Systems Group (ASG), was selected as the prime vendor for the ER/MP program, the company was a relatively small defense company. The company had a limited staff of engineers, software developers, and technicians.[54] The company had a good reputation for rapidly integrating new capabilities into their aircraft through programs like the MQ-1B Predator and the MQ-9 Reaper.[55] However, their personnel structure and development approach did not necessarily comply with standard business practices required of an ACAT-1D program OEM. Their software development process, for one, lacked detailed requirements definition, documentation and validation.[56] GA-ASI focused not on mass production but rather on small, incremental changes and upgrades. The company achieved their quality assurance through controlled in-house development and manufacturing down to the board level.[57]

The ER/MP program thus required a major readjustment of GA-ASI's design, software development and manufacturing processes. GA-ASI's limited resources and

personnel posed a problem for the ER/MP program. GA-ASI initially lacked sufficient design engineers, software developers and technicians required to manage multiple development projects for the Army, much less programs for the Air Force, other government agencies, and foreign military sales.[58] Over time the company grew, upgraded its manufacturing facilities, and developed formal processes that follow best industry standards and practices. In many ways, the company's former ad hoc processes were well-suited for rapid acquisition practices, as demonstrated by the successful development, fielding, and upgrades of the MQ-1B Predator and MQ-9 Reaper UAS. As the ER/MP program evolved into an ACAT-1D program, however, the company had to make significant changes. These formalized process changes for the ER/MP Program of Record ultimately reduced their ability to make rapid changes and adjustments to the aircraft, sub-systems and software. The formal processes required more upfront work on requirements definition, design and integration analysis, additional checks and reviews prior to implementation. Mr. Don Cattell, Director of Army Programs, GA-ASI Aircraft Systems Group, noted, however, that the introduction of formal processes, especially regarding software requirement definition and development, significantly reduced the turmoil and rework previously associated with the earlier program.[59] These process changes were necessary to stabilize the ACAT-1D program, but caused difficulties for the contractor when asked to accelerate the program and rapidly integrate new capabilities onto the aircraft to meet new warfighter requirements. The Government wanted it both ways.

The Army's ER/MP program shows how a Major Defense Acquisition Program significantly affected by the Urgent Operational Needs from the Theaters of

Operations—Iraq and Afghanistan—can improve despite disruption. Analyzing how the program managed the challenges of developing and testing an advanced aerial ISR weapon system while meeting warfighter needs in near-real time provides instructive insights for future programs.

The decision to delay the main Program of Record and accelerate the early fielding of the ER/MP system was a calculated risk. From a cost, schedule, and performance standpoint, the disruption would have overwhelmed most other programs. However, demand for additional ISR and UAS capabilities in theater, coupled with senior level support, enabled the ER/MP program to survive the tumultuous transition from an ACAT II program to an ACAT 1D program. Accelerating schedule, increasing requirements, and significantly increasing the total program costs all introduced risks that had to be mitigated by the PM, Original Equipment Manufacturer, and Army Staff.

A significant influence on any rapid acquisition acceleration of a major Program of Record is force structure. To field a system successfully, the Army must have soldiers ready to use the equipment. When standing up a new unit around a new capability such as the MQ-1C ER/MP, the Army must allocate personnel spaces as a part of the Force Management process through the Total Army Analysis (TAA). The ER/MP was originally scheduled to field only one new unit per year. The biennial TAA allocated sufficient personnel to meet that objective. However, the OSD and warfighter request to rapidly accelerate the ER/MP unit fielding from one unit to three units in the first year proved unsustainable for lack of available personnel. Even if the production capacity of the OEM could have supported the acceleration of equipment, the Army's force structure was unable to adjust as rapidly. In the end, the choice to redirect forces

to meet the rapid acceleration demands requires very high level authority and a significant shift in priorities. The ER/MP program and the Army Force Management Team eventually settled on accelerating one additional unit per year.[60]

Since its start in 2007, the ER/MP program has successfully transitioned from an ACAT-II program to a fully established ACAT-1D program.[61] Following the evolutionary acquisition process model has enabled the Program Manager and Army Staff to successfully integrate MALE UAS technology into the field quickly while continuing to develop its capabilities.[62] The program overcame the initial wartime disruption by innovating and assuming risks. Through the transition, the Army's UAS program developed a stronger, more integrated approach to developing and fielding new capabilities. The main elements of success for the ER/MP program were the increased warfighter demand for any and all ISR capabilities, senior leader focus (including the interest of the Secretary of Defense), additional funding, assumption of risks, and diligent work by the Program Management Staff, Army Headquarters Staff, and industry partners.

Conclusion

For the Army, the number of large, multi-year development programs will diminish in the coming years, as evidenced by reductions in the Future Combat Systems program. Army leaders have recognized the need to field new technologies and improved capabilities while continuing to meet the long term modernization and transformation objectives. The Army can no longer afford to wait several years to develop objective systems before fielding. Current and emerging programs must be designed and funded to provide improving capabilities in an evolutionary development-fielding model. The evolutionary acquisition process demands an acquisition strategy

that can field a 75 percent solution to soldiers as quickly as possible. The Army Staff

and Program Managers must also develop and resource a plan to upgrade or replace a

system as new technologies emerge. The PMs must carefully manage the costs and

challenges associated with P^{3}I initiatives and sustainment of multiple configurations

while continuing to produce and field the new system. Costs are always an

independent variable. Budgeting for an evolutionary acquisition program remains

difficult. Individual appropriation accounts, or "color of money," must synchronize with

the program schedule. Well-established programs following an evolutionary strategy

must continue to invest in research & development while procuring and sustaining

completed system configurations.

The prime mission of the Army Acquisition Corps must remain meeting the

warfighters' Urgent Operational Needs. The rugged terrain and geopolitical complexity

of current Theaters of Operation demand that sophisticated UAS and other advanced

technologies reach soldiers rapidly. Spurred by warfighters' needs, the Secretary's

focus and the diligence of Program Managers and Army Headquarter Staff, the Army's

ER/MP UAS program has responded flexibly and strategically to critical rapid acquisition

initiatives.

Recommendations

To meet immediate and long-term warfighter requirements, the following

recommendations are proposed:

1. Require all MDAP Acquisition Strategies and budget profiles follow an

   evolutionary acquisition process with multiple incremental fielding of

   technologies and plans for incremental improvements over time to meet the

   rapid change in warfighters' operational requirements. The MDA may grant

exceptions to this mandate for only a limited number of systems with clear and compelling justifications.

2. Add a mid-phase review to each phase of DAS to specifically address current and emerging JUONS and other immediate warfighter requirements related to the MDAP system. Modify both program strategy and budget baseline accordingly before the next major milestone decision as necessary. The MDA and PM must carefully monitor and mitigate any cost increase to the program to avoid any breach of contract.

3. Recommend Congress grant the Secretary of Defense discretionary funding up to $250 million annually to cover programs significantly affected by Rapid Acquisition Initiatives.

4. Provide Program Managers incentives for meeting or exceeding operational goals, to include successful incremental early fielding of capabilities. Provide Program Managers and industry incentives to take reasonable risks to meet JUONS and other unplanned but urgent requirements.

Following the four recommendations will significantly change the long term structure and execution of many MDAPs. Funding and requirement processes must likewise adapt to such changes in the acquisition process.

Meeting the warfighters' needs while simultaneously transforming the force poses a daunting challenge in peacetime. Our Army must do so while fighting two wars, when soldiers' needs are most critical. The Acquisition Corps and Defense Acquisition Systems must meet the demands of the current operational environment and remain flexible enough to adapt to changing technologies and warfighters' needs. The Army

must meet these acquisition goals in timely, safe, and operationally efficient manner.

The Acquisition Community, OSD, Service Staffs, Congress, and Industry must respond

with agility to rapid acquisition requirements. Mission success and soldier's lives

depend upon making a responsive acquisition bureaucracy a reality rather than an

oxymoron.

Endnotes

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